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Supply Chain Disruption in the Health Care During the Pandemic Period

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ARTICLE INFO	ABSTRACT
<p>Received: 18-07-2022 Received in revised form: 25-08-2022 Accepted: 30-08-2022 Available online: 30-09-2022</p> <hr/> <p>Keywords: Demand and Supply; Dearth; Disruption; Logistics; Medical Devices; Outbreaks; Pharmaceutical; PPE Kits; Procurements; Surgical; Supply.</p>	<p>If we see, what came in short during COVID -19 was a major disruption in health facilities and a shortage of pharmaceuticals. The pandemic's severe lack of essential medical supplies created significant procurement difficulties in the healthcare supply chain (HCSC). The discussion on how to improve the supply chain in healthcare is picked up steam because maintaining the availability of such items during disruptions is essential. We provide factual data from a multi-level case study including nine hospital and medical supply manufacturing organisations throughout Andhra Pradesh. We looked into procurement-related ways to increase the availability of medical inventory based on resource dependence. Through semi-structured scheduled interviews, we obtained seven ideas on buffering approaches for changing resource dependencies and enhancing supply chain resilience in a pandemic. The remarkable COVID-19 epidemic has impacted every country, company, and supply chain. The pandemic put the healthcare system in crisis, with hospitals on the verge of closing due to capacity overflow, vital item supply chains disrupted, and federal and state authorities failing to take preventative measures. While contingency plans and stockpiles were in place for governments and private sector companies, the pandemic uncovered numerous significant supply chain weaknesses, including a lack of personal protective equipment (PPE) and testing kits.</p>

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1.0 INTRODUCTION

The complexity of healthcare supply chains (HCSC) has increased due to rising demand, rising costs, and increased competition. These factors have also increased interdependencies and efficiency awareness. The main reasons for these difficulties were export limits, border crossing limitations, and production capacity-limiting infection protection measures. Medical supply makers were to deal with a shortage in the supply of the materials needed for production. Healthcare experts compared

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themselves to firefighters. Putting out the fire without water is not just a saying but happens for real. The capability of hospitals and medical supplies producers to secure enough COVID-19-related medical supplies or necessary production materials and components has become a key challenge. Due to their population, duration, and high viability of uncertainty, the COVID-19 crisis's disruptions stand out significantly from those generated by other SCs.

1.1 Objectives

- To find which supply in medicine is affected during the covid times.
- To find whether the supply chain was disrupted due to the sudden necessity of medicine, equipment, or the procurement itself.
- To find whether, oxygen cylinders, PPE kits, throat swabs, masks, sanitizers which has the more significance of usage during the pandemic and which has high demand.
- To find who are most affected related to medical service sector.

1.2 Review of Literature

[Fakhimi et al., \(2015\)](#) say that, for the purpose of modelling emergency medical services, they combined non-continuous event simulation and agent-based simulation. For the purpose of locating system bottlenecks, the DES was utilised to simulate the EMS's workflow. In contrast, ABS incorporated a GIS to model ambulance trackmen and their communication operations centre. In order to analyse sustainable planning options for EMS, an integrated model of DES and ABS was created. Emergency call centres, vehicles, and crews were considered when modelling ambulance services using the ABS paradigm for sustainability.

The report by [Sharma et al., \(2020\)](#) demonstrates how the current outbreak can teach businesses, and Indian enterprises individually, important lessons. Lean supply chain amplitude of vibration short-term earnings also increases supply chain risk. Corporate decision-makers have learned from COVID-19 because when creating future supply chain designs, they must stress new performing measures, including shortage, responsiveness, and reconfiguration, in addition to cost, quality, and delivery. The government should encourage private testing equipment to make contracts for creating COVID-testing PPE kits.

In their study, [Guan et al., \(2020\)](#) show the model's first key finding is that the number of affected nations, followed by the length of time that lockdown measures must be in place, determines the pandemic's overall cost; the strictness of these measures, however, is comparably less crucial. The primary factor influencing the worldwide cost is the pandemic's geographic scope. Our findings imply that the global supply-chain implications would have been felt even if only China had been impacted.

[Aday and Aday \(2020\)](#) citations articulate that even in the event of quarantine restrictions or border closures, it is crucial to keep the flow of agricultural inputs between nations going. Because these necessities are essential for the proper operation of planting activities, steps should be taken immediately to promote the trade of farming inputs, including tools and fertiliser. Since the availability of food levels is high and the outlook for producing essential staples is favourable, it is also crucial to understand the COVID-19 influence behind restriction regulations. Due to increasing consumer high demand and the need to protect vulnerable people from price rises, governments are nevertheless trying to secure food security despite these favourable conditions.

Kuehn (2021) says that developing a supply chain more like PPE would have been helped by an adequate examination of a prior health disaster. As a result, it would be created to ensure greater supply chain visibility, which has been identified as a crucial component "to allowing key decision-making accuracy, which will, in turn, strengthen the ability of local, state, and federal health care and public health decision-makers to respond."

Scala and Lindsay (2021) articulate vital findings highlighting the role of resilience techniques in the supply chain's resilience during the COVID-19 pandemic response, including agility, collaboration, flexibility, and redundancy. Public sector networks are seen as facilitating cooperation, highlighted as a fundamental mechanism for resilience—increased visibility levels within the supply chain materials were not supported by established collaborative relationships with suppliers.

Moosavi *et al.*, (2022) The management of all processes necessary to guarantee that the right product reaches the client at the proper location and time is known as supply chain management. Due to the changing nature of the needs at the various system levels (such as the state, district, and hospital/clinic), implementing this becomes particularly difficult during catastrophes. Furthermore, the peak caseload may be attained at different periods in various locations in the case of multi-locational events like pandemics. Disasters frequently cause people to become "panicked", ordering more than they need out of fear of running out.

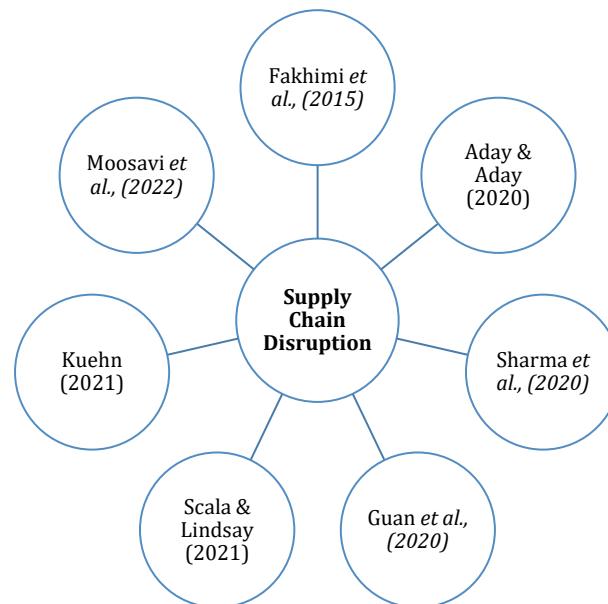


Figure 1 – Supply Chain Distribution from Authors

Table 1 – Common Factors from the Literature Review

No Table of Figures Entries Found	Resilience	Lack of Standardisation	Visibility	Bottlenecks	Sustainability
Moosavi <i>et al.</i> , (2022)	Yes	No	No	No	Yes
Fakhimi <i>et al.</i> , (2015)	No	Yes	Yes	No	No

Sharma et al., (2020)	Yes	No	Yes	Yes	No
Kuehn (2021)	Yes	Yes	No	No	Yes
Guan et al., (2020)	No	No	Yes	Yes	Yes
Scala & Lindsay (2021)	Yes	No	No	No	Yes
Aday & Aday (2020)	No	No	Yes	No	Yes

2.0 RESEARCH METHODOLOGY

The descriptive research study was conducted with 218 respondents selected by a judgemental sampling technique. The well-structured questionnaire was adopted with 5-point Likert scale to collect the primary data. Collected data were analysed with correlation and regression tools. This article specifically focussed on dimensions of SCD (Supply Chain Disruption); this literature research yielded different articles (Exploratory and causal study).

3.0 ANALYSIS AND INTERPRETATION

The information was evaluated and analysed in light of our study goals once it was acquired. A majority of respondents to the survey, which served as a source of data for the study's indicative response patterns, agreed with a score of four on a five-point Likert scale.

Table 2 – Correlation between Medicines During COVID-19

Correlation	Sudden rise in demand for medicines	Lack of effective supply	Procurement	Transportation
Sudden rise in demand for medicines	1			
Lack of effective supply	0.053216884	1		
Procurement	0.013523408	0.009434319	1	
Transportation	-0.128271167	-0.080716341	0.03405084	1

As we can see from the above table correlation between vulnerability during the pandemic and post-pandemic correlation coefficients are 0.013523408, 0.009434319, and 0.03405084. We need to procure the stock according to analysis so that the supply chain will effectively work when there is a sudden rise in demand.

Table 3 – Correlation on Which of the Instrument Went High

Correlation	According to you, demand for which of the following has gone high (Oxygen Cylinders)	Which of the following caused more Vulnerability during COVID-19
According to you, demand for which of the following has gone high (answer can be one or more)	1	
Which of the following caused more Vulnerability during COVID-19	0.031509714	1

The above correlation process shows that the oxygen cylinder demand has risen during COVID- 19. There is a high significance of 0.031509714.

Table 4 – Correlation between the Masks and their Demand

	Coefficient	Standard Error	t-Stat	p-Value	Lower 95.0%	Upper 95.0%
Intercept	3.054552	0.199268	15.32888	7.644750E-36	2.661675184	3.447429265
Masks	-0.05604	0.073804	-0.75934	0.448524128	-0.201553167	0.089469756

The correlation between the sudden rise in demand for masks has no significance as the p-value is greater than 0.05. in comparison, oxygen cylinders and throat swabs have more significance than others.

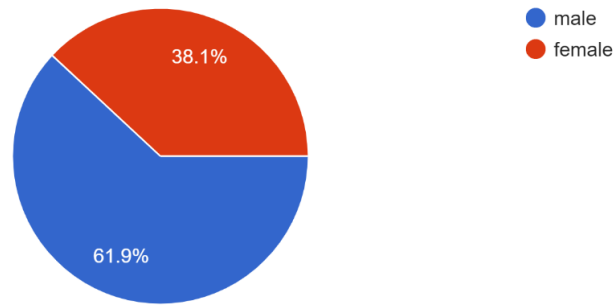


Figure 2 – Gender wise Classification of the Sample Respondents

From Figure 1, 61.9% of the responses are from males and 38.1% from females.

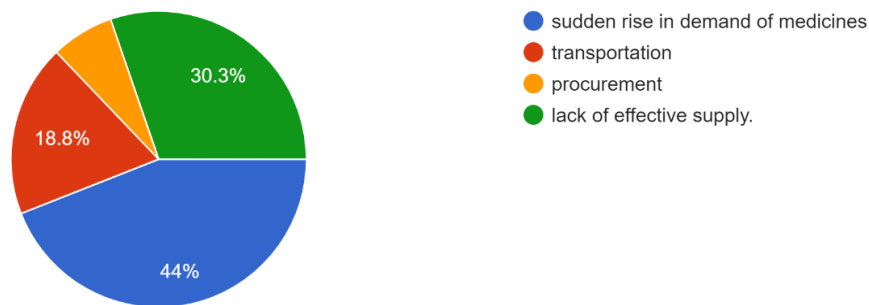


Figure 3 – Factors Caused More Vulnerability During COVID-19

Vulnerability during the covid was high for a sudden rise in demand for medicines by 44%, lack of effective supply was found to be 30.3%, and the least is for procurement. As there is no transportation throughout, the supply chain processes are held up. Most vulnerabilities are like the butterfly effect, like how one affects the other.

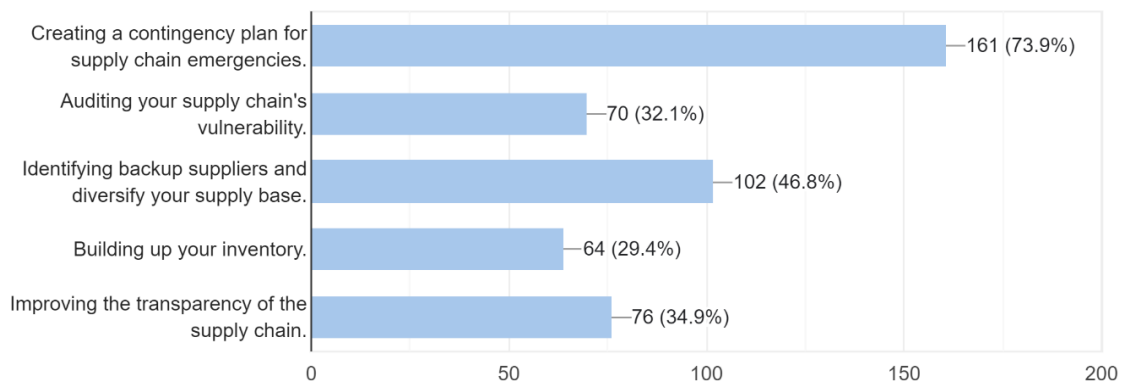


Figure 4 – Factors Which Help to Overcome Another Pandemic

Creating a contingency plan has the highest analytical response from both genders, ages above 35 are seeking medicines. Whereas ages under 20-25 prefer food, as above 35 years of age are suffering from commorbidities.

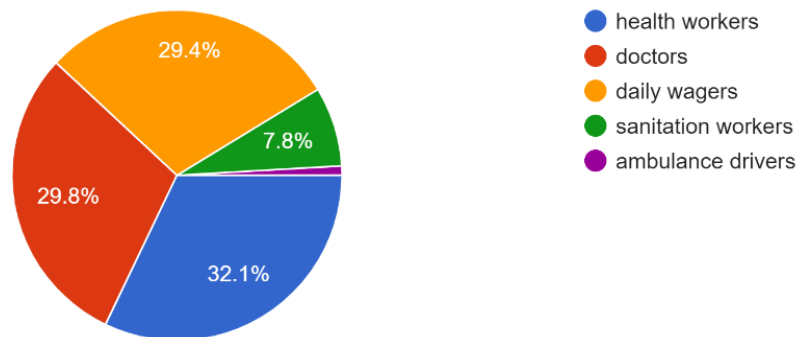


Figure 5 – Workers Affected by this Process of the Pandemic

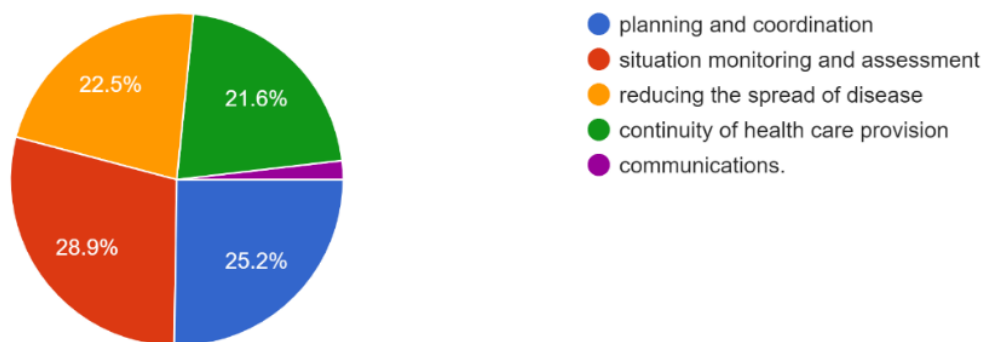


Figure 6 – Measures were taken for Encountering Another Outbreak (SARS, COVID-19, Plague, Influenza)

4.0 FINDINGS AND RECOMMENDATIONS

- Vulnerability during the covid was high for the sudden rise in demand for medicines by 44%, lack of effective supply was found to be 30.3%, and the least is for procurement. As there is no transportation throughout, the supply chain processes are held up. Most of the vulnerabilities are like the butterfly effect, just like how one affects the other
- Creating a contingency plan has the highest analytical response from both genders, ages above 35 are seeking medicines. Whereas ages under 20-25 prefer food as those above 35 ages are suffering from comorbidities
- Bottlenecks can be eliminated as a sudden rise in the supply chain can disrupt the entire medical industry.

5.0 CONCLUSION

Therefore, I want to draw the conclusion that there were a lot of bottlenecks in the study, such as the need for situation monitoring and assessment. The fragility of oxygen cylinders in a pandemic is also significant. It has not only resulted in a shortage of resources but also a real lack of supply. The study sample of 218 revealed that more health workers, such as paramedical technicians, are needed, and that doctors, health workers, and medical lab technicians have the most infectious jobs. Lack of

procurement and sudden rise in demand are the two things that lead to disruption. The sudden supply chain failure was caused by and resulted from an abrupt increase in demand.

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